Space Weather Forecast

Issued on Wednesday, 05 October 2022 at 13:13 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor storms possible throughout. Ongoing likelihood of Moderate flares with slight chance of isolated Strong flares due to two notable sunspot groups.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate, with one Moderate-class flare from a region close to the northwest limb and has produced a number of Common-class flares. A large region in the northeast has also produced some Common-class flares. The remaining four regions all appear to be magnetically simple. Two CMEs (coronal mass ejections) on 04 October have been analysed, one from the northwest and one from the southeast quadrant, with initial forecasts suggesting an arrival either late on 06 or during 07 October. Meanwhile, a filament eruption (arc of plasma), which lifted off the southwest quadrant early on the 5th Oct, produced another CME, which is currently under analysis for any potential Earth-directed component.

Solar Wind / Geomagnetic Activity: Solar wind speeds have been elevated, mainly due to the effects of a fast solar wind. Total magnetic field strength has declined from moderate to weak levels through the day. The north-south component of the magnetic field has varied weakly between positive and negative values, but has been persistently negative from late on 04 October. Geomagnetic activity was mainly Quiet to Active (Kp 2-4), but with one G1/Minor Storm (Kp 5) interval.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) has trended back to background levels, with no solar proton storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be Moderate, with a chance of High levels, due to likely further flares from the large region in the northeast and the region in the northwest.

Solar Wind / Geomagnetic Activity: There is a risk of a CME arriving at Earth either late on 06 October or during 07 October. The current fast solar wind stream is expected to subside to background through the next few days in the absence of CME effects. A further fast wind is then forecast to connect with the Earth on 08 October. Geomagnetic activity is forecast to be mainly Unsettled with Active intervals at first on 05 October, with a slight chance of G1/Minor Storm intervals, but then falling to Quiet with Unsettled intervals. Mainly Quiet for much of day 2, but then the possible low confidence CME arrival could lead to G1/Minor Storms later in the day and through much of 07 October. The connection to the fast wind on 08 October could give further G1/Minor Storms.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to be near or at background but with a chance of rising at times due to any further flaring from the notable sunspots. This giving a slight chance of exceeding the S1/Minor Storm threshold.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	10	15	15	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	60	60
Very Active	R3 to R5 X	No	20	20	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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